
Jaltomata sagastegui and *Jaltomata cajamarca* (Solanaceae), Two New Shrubs from Northern Peru

Thomas Mione and Lawrence A. Coe

Biological Sciences, Central Connecticut State University, New Britain,
Connecticut 06050-4010, U.S.A.

ABSTRACT. *Jaltomata sagastegui* and *J. cajamarca*, both of Peru, Dept. Cajamarca, Prov. Contumazá, are described and shown in photographs. *Jaltomata sagastegui* is self-compatible and has a chromosome number of $n = 12$; the type was collected at 2500 m elevation. *Jaltomata cajamarca* grows between 1700 m and 2600 m elevation. Berries of both species are eaten by humans.

RESUMEN. *Jaltomata sagastegui* y *J. cajamarca*, las dos de Perú, dpto. Cajamarca, prov. Contumazá, se describen y muestran en fotografías. *Jaltomata sagastegui* es auto-compatible y tiene un número de cromosomas de $n = 12$; el tipo fue colectado a 2500 m s.n.m. *Jaltomata cajamarca* crece entre 1700 m y 2600 m s.n.m. Las bayas de las dos especies son comestibles.

Jaltomata Schlechtendal (including *Hebecladus* Miers) is a diverse genus of about 30 species of herbs and small shrubs that are widely distributed, from Arizona, U.S.A., to southern Bolivia, the Galápagos Islands, and the Greater Antilles. This paper is part of an ongoing series of studies of the systematics of this genus (D'Arcy et al., 1992; Davis, 1986; Davis & Bye, 1982; Knapp et al., 1991; Mione, 1992; Mione & Coe, 1992; Mione et al., 1993; Mione et al., 1994; Mione & Bye, 1996).

After careful study of taxonomic literature, herbarium specimens, and living plants of some 20 *Jaltomata* species, we recognize *J. sagastegui* and *J. cajamarca* as new species. In a study of phylogeny based on chloroplast DNA characters, these two species formed a monophyletic group within an otherwise unresolved lineage of *Jaltomata* species of South America and the Greater Antilles (Mione et al., 1994).

METHODS

Part of our approach has been to grow plants of as many accessions of *Jaltomata* as possible. For this study seeds were collected in the field when plants were pressed, and were kindly sent to T.M. by A. Sagástegui A. and M. O. Dillon (F). Plants

were raised and studied in the greenhouse at the University of Connecticut, Storrs, and herbarium specimens of these plants were deposited at CONN. For each seed accession, we compared the morphology of field-collected herbarium specimens with greenhouse-grown living and herbarium specimens. This provided some understanding of the range of phenotypes possible from one accession, and allowed us to compare the three-dimensional corolla shape of living plants with the corolla as it appears when pressed at various angles. Specimens raised from seed always appeared conspecific with the field-collected specimen from which seeds were collected. Living plants of *J. sagastegui* were also used to assess stigma compatibility, and to obtain chromosome counts from meiocytes of immature anthers stained with acetic carmine.

Hair morphology was studied, and hairs were measured with wet mounts (including leaf cross sections) and toluidine blue stain. The indicated number of flowers per inflorescence includes open flowers and flower buds. Calyces of *Jaltomata* are accrescent, and the calyx was therefore measured separately at anthesis and at fruiting. Calyx lobe radius and calyx sinus radius were measured from the point of attachment of the pedicel. Corolla diameter was measured as the distance between the tip of a randomly chosen corolla lobe and another on the opposite side of the corolla, without flattening the corolla of living plants. Stamen length includes the anther. Pollen grain diameter was measured with a compound microscope after staining pollen 30 minutes in "cotton blue" stain. Stigma diameter was measured both on living material, by orienting the style vertically (stigma up) under a dissecting microscope, and on specimens pressed from greenhouse-grown plants. Style length includes the stigma. Calyx lobe radius and calyx sinus radius at fruiting were measured either from the point of attachment of the mature fruit or the center of the pedicel. Fruits, nearly spherical berries, were measured on isotypes for both species, and on living specimens for *J. sagastegui*. The descriptions are based primarily on greenhouse-grown

plants (from seeds of the type collections), but are also based on the isotypes where noted.

Jaltomata sagastegui Mione, sp. nov. TYPE: Peru. Dept. Cajamarca, Prov. Contumazá: "alrededor de Guzmango, 2,500 m, borde de acequia, 9 Junio 1990," A. Sagástegui A. 14388 (holotype, F; isotype, Mione herbarium). Figure 1.

Corolla tubulosa-brevis cum limbo rotato, limbus quinquelobus; stamina non exserta a corollae tubo; stylus 3.5–5 mm longus; calyx parvus fructifer, lobi radius ad 4.5 mm, sinus radius ad 3 mm.

Branching shrub to 1 m. Younger stems somewhat 4- or 5-sided, woody stems (brown) terete and hollow. Hairs of young stems dendritic, rarely forked or of the finger type, to 0.4 mm long. Leaves often geminate; ovate (Fig. 1a), the apex sometimes acuminate, margin entire or repand; 3.2–14 cm long, 1–6.5 cm wide; adaxially and abaxially tomentose with interspersed dendritic and finger hairs 0.04–0.22 mm long. Inflorescence to 12-flowered; sometimes branched. Peduncles 9.5–28 mm long, longer than attached pedicels; green; straight (Fig. 1b); ligneous at fruiting; pedicels 4.5–7 mm long. Calyx at anthesis green; 5.1–6.5 mm diam.; lobe radius 2.6 mm; sinus radius 1.2 mm; abaxially tomentose with a dense covering of branched hairs (Fig. 1b); lobes reflexed. Corolla short-tubular with a rotate limb (Fig. 1b); limb with 5 corolla lobes alternating with 5 inconspicuous to absent lobules (Fig. 1a); white with two purple ovate maculae straddling the main vein to each corolla lobe; limb 11–14 mm diam.; tube 4–5 mm long and 4.5–5 mm diam. Stamens 3.2–3.4 mm long, not exerted beyond mouth of corolla tube (Fig. 1a). Filaments with finger hairs along basal 40–50%, the hairs to 0.5 mm long. Anthers, undehisced 1.6–2.0 × 1.3–1.5 mm. Pollen grains 75,000–93,000 per flower, 25–30 μm diam. Stigma (arrow, Fig. 1a) diameter 0.33–0.6 mm. Style length 3.5–5.4 mm, exerting 1–3 mm beyond anthers (Fig. 1a). Ovules 56–87 per ovary. Fruits 5–8 mm across (Fig. 1c), yellow-orange (type), orange (greenhouse). Calyx (fruiting) small (Fig. 1c): lobe radius to 4.5 mm, sinus radius to 3 mm. Chromosome number $n = 12$.

Jaltomata sagastegui, now known only from the type, is distributed at least in northern Peru, Dept. Cajamarca, prov. Contumazá. The type, collected in June, bears fruits. The herbarium label indicates that the fruits are eaten, and the local name is "canamuella." The specific epithet was chosen to honor the eminent Peruvian botanist Abundio Sagástegui Alva.

Jaltomata cajamarca Mione, sp. nov. TYPE: Peru. Dept. Cajamarca, Prov. Contumazá: "alrededores de Guzmango, 2,500 m, ladera con arbustos, 9 Junio 1990," A. Sagástegui A. 14389 (holotype, F; isotypes, CONN, Mione herbarium). Figure 2a, b.

Corolla brevis recta-tubulosa cum limbo rotato, limbus cum quinque lobis alterantibus cum quinque minoribus sed conspicuis lobulis; stamina et stylus exserta a corollae tubo; stylus 5.5–11 mm longus; calyx parvus fructifer, lobi radius 3–5 mm, sinus radius 1.8–2.7 mm.

Branching shrub to 1 m. Younger stems angular with 4 or 5 projecting longitudinal ridges (Fig. 2b), older stems (brown) approaching terete. Young stems bearing both dendritic and finger hairs, to 2.2 mm long; older axes glabrate. Leaves often geminate; ovate, the apex sometimes acuminate; margin entire, repand, or less commonly bluntly toothed; 4–16 cm long, 2–5 cm wide; scabrous, especially the younger leaves; hairs adaxially either all dendritic or having interspersed dendritic and finger hairs, 0.07–0.3 mm long, abaxially mostly of the finger type, rarely gland-tipped, 0.05–0.2 mm long. Inflorescence to 17-flowered; sometimes branched (with four orders of axes on an isotype). Peduncle to 19 mm long; pedicel 4–13 mm long. Calyx at anthesis rotate; 6.3–7 mm diam.; lobe radius 2.7–3 mm; sinus radius 1–2 mm. Corolla short tubular with a rotate limb; the limb with 5 lobes alternating with 5 smaller lobules (Fig. 2a); limb 16–22 mm diam.; lobe radius 7.5–9 mm; sinus radius 4–5.5 mm; straight tube 3 mm long by 5 mm diam.; violet to white, with ring of purple at the tube-limb interface (Fig. 2a). Stamens 3.4–5.9 mm, exerting 1–4 mm beyond corolla tube (Fig. 2). Filaments villous on basal 45–90% (Fig. 2a), the finger hairs to 1 mm long. Anthers, dehisced 0.8–1 mm long. Pollen grains 105,000 per flower, 25–30 μm diam. Stigma 0.33–1.06 mm diam., usually noticeably broader than the style. Style 5.5–11 mm long, exerting a few mm beyond anthers. Ovules 76 per ovary. Fruits 3–5 mm diam., yellow-orange (type). Calyx (fruiting) stellate, small: lobe radius 3–5 mm, sinus radius 1.8–2.7 mm (isotype). Infructescence to 13-fruited (isotype).

Jaltomata cajamarca is distributed in northern Peru, Dept. Cajamarca, Prov. Contumazá. Its habitat is roadsides and hillsides with shrubs, between 1700 and 2600 m. Flowering and fruiting occur from March through June. The fruits are eaten (*Sagástegui* 10315, 12546, 13050, 14121), and the local name is "canamuella" (*Sagástegui* 10315, 12546, 13050, 14121).

Paratypes. PERU. Dept. Cajamarca, Prov. Contuma-



Table 1. Comparison of some characters of *Jaltomata sagastegui* and *J. cajamarca*.

	<i>J. sagastegui</i>	<i>J. cajamarca</i>
Young stem shape	somewhat 4 or 5-sided	4 or 5 projecting longitudinal ridges
Maximum hair length on young stems	0.4 mm	2.2 mm
Leaf margin	never toothed	sometimes toothed
Corolla lobules (alternate with 5 prominent lobes)	inconspicuous to absent	prominent
Stamen length	3.2–3.4 mm	3.4–5.9 mm
Stamens exerted beyond corolla tube	no	1–4 mm
Hairs borne along _____ of length of filament	40–50%	45–90%
Style length	3.5–5.4 mm	5.5–11 mm
Stigma diameter	0.33–0.6 mm	0.33–1.06 mm

zá: Yetón-Guzmango, 29 Apr. 1982, A. Sagástegui A. et al. 10315 (HUT, MO); Andaloy (San Benito-Yetón), 28 Mar. 1985, A. Sagástegui A. & S. Leiva G. 12546 (F); Andaloy (San Benito-Yetón), 23 Mar. 1988, A. Sagástegui A. et al. 13050 (F, HUT); La Pampa (Guzmango), 7 May 1989, A. Sagástegui A. 14121 (F, HUT); Yetón (San Benito-Guzmango), 7 Apr. 1990, A. Sagástegui A. & C. Sagástegui C. 14254 (F); El Chorrillo (Cascas-Contumazá), 16 June 1994, A. Sagástegui A. et al. 15301 (F).

Although similar, *Jaltomata sagastegui* and *J. cajamarca* are easily distinguished (Table 1). Both are superficially similar to *J. propinqua* (Miers) Mione & M. Nee of Peru, Dept. Lima, with which they share a short tubular corolla with a rotate limb. *Jaltomata propinqua*, however, has gland-tipped hairs and a style approximately twice the length of the stamens, while *J. sagastegui* and *J. cajamarca* essentially lack gland-tipped hairs, and their styles extend at most a few millimeters beyond the stamens. To our knowledge, no other *Jaltomata* species have a short-tubular corolla and a broad limb.

Reproductive biology. *Jaltomata sagastegui* (grown as T.M. accession 536) is self-compatible; fruits were usually set following manual self-pollination and were occasionally set in a pollinator-free greenhouse. When ripe fruits were manually removed articulation was at the base of the pedicel. *Jaltomata cajamarca* (grown as T.M. accession 537) did not set fruit following six manual self-pollinations, nor were fruits set from six interplant pollinations involving three different plants from seeds of the type collection. It is possible that this lack of fruit-set was due to suboptimal growing conditions. Thus, at this time no conclusion can be made about stigma compatibility of *J. cajamarca*. All oth-

er *Jaltomata* species (16) assessed to date are self-compatible. Crosses between *J. sagastegui* and *J. cajamarca* were not attempted, nor were other interspecific crosses involving these species.

Most *Jaltomata* species assessed to date are protogynous, with anthesis occurring early in the morning and anthers remaining undehisced during that day (Mione, 1992). *Jaltomata sagastegui* lacks protogyny. Observations made in early April 1992 indicated that all anthers dehisced prior to 8:00 a.m. on the day of anthesis. Although several *Jaltomata* species of Peru and Bolivia produce copious, bright red/orange nectar at the base of translucent corollas, *J. sagastegui* and *J. cajamarca* have neither of these features (Figs. 1, 2). Flowers of all Mesoamerican species of *Jaltomata* close at dusk for the night, while flowers of *J. sagastegui*, *J. cajamarca*, and many, but not all, of the other South American species remain open at night (Mione, 1992).

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Figures 1, 2. 1a–c. *Jaltomata sagastegui* Mione (grown from seeds of *Sagástegui A. 14388*). —a. Shoot, flower with arrow indicating stigma. —b. Inflorescence, side view of flower. —c. Fruit with calyx. 2a, b. *Jaltomata cajamarca* Mione (grown from seeds of *Sagástegui A. 14389*). —a. Shoot, flower with exerted stamens and style. —b. Shoot with numerous open flowers. All bars = 5 mm.

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